



FEDERAL LAW ENFORCEMENT
WIRELESS USERS GROUP
WASHINGTON, D.C.

ORIGINAL



February 29, 2000

EX PARTE OR LATE FILED

Magalie Roman Salas
Secretary
Federal Communications Commission
TW-A325
445 Twelfth Street, S.W.
Washington, D.C. 20554

RECEIVED

FEB 29 2000

Re: WT Docket No. 99-168

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Dear Ms. Salas:

On behalf of the Federal Law Enforcement Wireless Users Group attached herewith is an original and four copies of an Extension for Time to file a Petition for Reconsideration and a Petition for Reconsideration filed pursuant to Section 1.46 and 1.429 of the Commission rules.

Kindly date-stamp the additional, marked copy of this cover letter and return it in the envelope provided.

Should you require any additional information, please contact the undersigned.

Respectfully submitted,

James J. Fitzgik
Deputy Assistant Secretary
(Information Systems)
Chief Information Officer,
Department of the Treasury, and
Vice Chair, Government Information
Technology Services Board

No. of Copies rec'd 014
List A B C D E

RECEIVED
FEB 29 2000
U.S. CUSTOMS AND BORDER PROTECTION
OFFICE OF THE SECRETARY

))))))))

WT Docket No. 99-168

1

6. The FLEWUG respectfully requests that the Commission grant its Petition for Extension of Time in order for the Commission to develop a full and complete record in the above-referenced proceeding.

CONCLUSION

7. For the reasons set forth above, the FLEWUG respectfully requests that the Commission grant an extension of time for filing a petition for reconsideration from February 22, 2000 to February 29, 2000 and accordingly modify its deadline for filing any oppositions to petition for reconsideration for the aforementioned proceeding.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "J. Fitzik". The signature is stylized with a large, looping initial "J" and a cursive "Fitzik".

James J. Fitzik
Deputy Assistant Secretary (Information Systems)
Chief Information Officer,
Department of the Treasury, and
Vice Chair, Government Information Technology
Services Board

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of

Service Rules for the 746–764 and
776–794 MHz Bands, and
Revisions to Part 27 of the
Commission’s Rules

WT Docket No. 99–168

**FEDERAL LAW ENFORCEMENT WIRELESS USERS GROUP’S
PETITION FOR RECONSIDERATION**

1. Pursuant to Section 405 of the Telecommunications Act of 1934, as amended¹ and Section 1.429 of the Federal Communications Commission’s (Commission) rules,² the Federal Law Enforcement Wireless Users Group (FLEWUG)³ respectively requests reconsideration of the Commission’s First Report and Order *In the Matter of Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules* (First R&O).⁴

¹ 47 U.S.C. § 405.

² 47 C.F.R. § 1.429.

³ The FLEWUG comprises law enforcement and public safety officials from the Department of the Treasury, Department of Justice, Department of Interior, Department of Agriculture, Department of Defense, Department of Health and Human Services, United States Postal Service, United States Postal Inspection Service, National Telecommunications and Information Administration, Federal Emergency Management Agency, Internal Revenue Service, Federal Bureau of Investigation, United States Secret Service, United States Coast Guard, United States Capital Police, Drug Enforcement Administration, United States Park Police, Immigration and Naturalization Service, United States Customs Service, Bureau of Alcohol, Tobacco, and Firearms, United States Mint, National Communications System, Defense Information Systems Agency, National Security Agency, Federal Law Enforcement Training Center, Bureau of Engraving and Printing, United States Marshals Service, National Institute of Standards and Technology, United States Forest Service, United States Fish and Wildlife Service, and Federal Bureau of Prisons.

⁴ Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules, WT Docket No. 99-168, *Report and Order*, FCC 00-5 (rel. Jan. 7, 2000).

I. STATEMENT OF INTEREST

2. In 1993, the Office of the Vice President issued a National Performance Review (NPR) report recognizing the need to improve public safety communications. The NPR, now known as the National Partnership for Reinventing Government (NPRG), and a subsequent Memorandum of Understanding between the Department of Justice and the Department of the Treasury, formally established the FLEWUG. The FLEWUG's membership includes more than 30 federal departments and agencies with law enforcement and other public safety responsibilities. Among the FLEWUG's critical objectives are the planning, implementation, and coordination of, shared-use, wireless communications systems and resources. Toward this end, the FLEWUG supports the development of shared-resource, shared-use wireless communications systems; the efficient use of the spectrum; and interoperability, as needed, among local, state, and federal public safety agencies.

3. Given the FLEWUG's charter, it has a vested interest in any proceeding that could affect the public safety's use of the 700 MHz band. This is particularly true in the case of standards governing the protection of public safety receivers in the 764-776 MHz and 794-806 MHz bands from adjacent commercial users. The FLEWUG applauds the Commission for adopting service rules for the 747-762 MHz and 777-792 MHz bands that can foster the development of a wide range of advanced wireless services. However, the FLEWUG believes that the out-of-band emission limits adopted by the Commission for transmitters operating in the 747-762 MHz and 777-792 MHz bands are not adequate to provide protection to public safety users that are developing systems to support nationwide interoperability between federal, state, and local law enforcement agencies. In submitting this petition, the FLEWUG seeks reconsideration of the out-of-band emissions limits for the commercial transmitters operating in the 747-762 MHz and 777-792 MHz bands.⁵

⁵ First R&O at ¶ 105.

II. A MORE STRINGENT OUT-OF-BAND EMISSION LIMIT FOR COMMERCIAL BASE AND FIXED TRANSMITTERS OPERATING IN THE 747-762 MHz BAND IS NECESSARY TO PROTECT ADJACENT BAND PUBLIC SAFETY RECEIVERS

4. In the First R&O, service rules were adopted by the Commission for commercial base and fixed transmitters operating in the 747-762 MHz band. The Commission adopted a maximum effective radiated power (ERP) limit of 1000 Watts for commercial base and fixed transmitters operating in the 747-762 MHz band.⁶ The Commission also adopted a limit of $76 + 10 \text{ Log (Power)}$ for the out-of-band emissions in the 764-776 MHz and 794-806 MHz public safety bands from commercial base and fixed transmitters operating in the 747-762 MHz band.⁷ As stated in the First R&O, the Commission adopted the out-of-band emission limit for commercial base and fixed transmitters operating in the 747-762 MHz band based on a compromise between the limit of $87 + 10 \text{ Log (Power)}$ proposed by Motorola and the limit of $65 + 10 \text{ Log (Power)}$ proposed by the FLEWUG.⁸ The Notice of Proposed Rulemaking (NPRM) in this proceeding did not propose power limits or antenna gains for the transmitters operating in the 747-762 MHz band.⁹ The out-of-band emission limit proposed by the FLEWUG was based on an analysis that assumed a transmitter equivalent isotropically radiated power (EIRP) of 50 Watts, which is much less than the maximum ERP limit of 1000 Watts that has been adopted by the Commission. The FLEWUG analysis also assumed a bandwidth of 1 MHz for the commercial base transmitter.¹⁰ Both of these parameters will have an impact on the out-of-band emission limit that is required to protect adjacent band public safety receivers.

⁶ *Id.* at ¶ 111.

⁷ *Id.* at ¶ 105.

⁸ *Id.*

⁹ Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules, WT Docket No. 99-168, *Notice of Proposed Rule Making*, FCC 99-97 (June 3, 1999) at ¶ 65.

¹⁰ A bandwidth of 1 MHz was thought to be consistent with requirements of third generation wireless systems. Third generation cellular standards have three main sets of criteria: a mobile data rate of 144 kbps, a portable data rate of 384 kbps, and an in-building fixed data rate of 2 Mbps.

5. Given the 1000 Watt ERP limit adopted by the Commission for commercial base and fixed transmitters in the 747-762 MHz band, the FLEWUG does not believe that the out-of-band emission limit adopted by the Commission in the First R&O will adequately protect adjacent band public safety receivers. An analysis is provided in Attachment A that assesses the potential interference to public safety receivers from commercial base and fixed transmitters operating in the 747-762 MHz band with the out-of-band emission limit adopted by the Commission. As shown in this analysis the distance separations that are required to preclude interference from a commercial base or fixed transmitter with the out-of-band emission limit of $76 + 10 \text{ Log (Power)}$ are relatively large depending on the bandwidth of the commercial base or fixed transmitter. Based on this analysis, the FLEWUG recommends that the Commission adopt a limit on out-of-band emissions for commercial base and fixed transmitters of $80 + 10 \text{ Log (Power)}$ in the 764-776 MHz and 794-806 MHz bands. The FLEWUG also recommends that the Commission adopt a minimum limit on the bandwidth for the commercial base and fixed transmitters operating in the 747-762 MHz band. The FLEWUG believes that adopting a minimum bandwidth on the order of 200 kHz would not impact the third generation wireless technologies envisioned for the 700 MHz bands. The FLEWUG believes that adopting this slightly more stringent limit on out-of-band emissions in conjunction with a minimum limit on the bandwidth of the commercial base and fixed transmitters operating in the 747-762 MHz band will provide adequate protection to adjacent band public safety mobile receivers. However, if the Commission does not adopt a minimum bandwidth for the commercial base and fixed transmitters operating in the 747-762 MHz band the FLEWUG believes that a more stringent limit on the out-of-band emissions should be considered in order to provide adequate protection to adjacent band public safety receivers.

III. A MORE STRINGENT OUT-OF-BAND EMISSION LIMIT FOR COMMERCIAL MOBILE TRANSMITTERS OPERATING IN THE 777-792 MHz BAND IS NECESSARY TO PROTECT ADJACENT BAND PUBLIC SAFETY BASE RECEIVERS

6. In the First R&O, service rules were adopted by the Commission for commercial mobile transmitters operating in the 777-792 MHz band. The Commission adopted a maximum ERP limit of 30 Watts for commercial mobile transmitters operating in the 777-792 MHz band.¹¹ The Commission also adopted a limit of $65 + 10 \text{ Log(Power)}$ for the out-of-band emissions in the 764-776 MHz and 794-806 MHz public safety bands from commercial mobile transmitters operating in the 777-792 MHz band.¹² As stated in the First R&O, the Commission adopted the out-of-band emission limit for commercial mobile transmitters operating in the 777-792 MHz based on the limits proposed by Motorola, the FLEWUG, and the National Telecommunications and Information Administration (NTIA).¹³ The NPRM in this proceeding did not specify whether fixed or mobile operations would be permitted in the 777-792 MHz band. The out-of-band emission limits in the 794-806 MHz band that were proposed by the FLEWUG, to protect adjacent band public safety receivers, were based on an analysis that considered two interference scenarios: 1) commercial base transmitter to public safety mobile receiver; and 2) commercial mobile transmitter to public safety mobile receiver. As stated in the First R&O, the Commission will allow commercial mobile transmitters to operate in the 777-792 MHz band.¹⁴ Therefore, the out-of-band emission analysis should also consider interference from a commercial mobile transmitter to a public safety base receiver. The FLEWUG and NTIA out-of-band emission analyses also assumed a 1 MHz bandwidth for the commercial mobile transmitter. Both of these factors will have an impact on the out-of-band emission limit that is required to protect adjacent band public safety receivers.

¹¹ First R&O at ¶ 111.

¹² *Id.* at ¶ 106.

¹³ *Id.*

¹⁴ *Id.*

7. The analysis provided in Attachment B assesses the potential interference to public safety receivers in the 764-776 MHz and 794-806 MHz bands from commercial mobile transmitters in the 777-792 MHz band. Based on this analysis, the FLEWUG believes that the out-of-band emission limit for commercial mobile transmitters operating in the 777-792 MHz band of $65 + 10 \text{ Log (Power)}$ will provide adequate protection to public safety mobile receivers in the 764-776 MHz band, provided that a minimum limit on transmitter bandwidth is also adopted. The FLEWUG recommends that a slightly more stringent out-of-band emission limit of $70 + 10 \text{ Log (Power)}$ in the 794-806 MHz band for commercial mobile transmitters operating in the 777-792 MHz band is required to protect public safety base receivers. In conjunction with the slightly more stringent limit on out-of-band emissions, the FLEWUG also recommends that a minimum allowable bandwidth should also be adopted. The FLEWUG believes that adopting a minimum allowable bandwidth on the order of 200 kHz would not impact the use of the 700 MHz band for third generation wireless technologies.

V. CONCLUSION

8. For the reasons set forth above, the FLEWUG respectfully requests that the Commission reconsider and accordingly modify its decision in the First R&O to make it consistent with the views expressed herein.

Respectfully submitted,



James J. Flyzek
Deputy Assistant Secretary (Information Systems)
Chief Information Officer,
Department of the Treasury, and
Vice Chair, Government Information Technology
Services Board

ATTACHMENT A
ANALYSIS OF OUT-OF-BAND EMISSIONS FOR COMMERCIAL BASE AND FIXED
TRANSMITTERS OPERATING IN THE 747-762 MHz BAND

INTRODUCTION

The Commission has adopted an effective radiated power (ERP) limit of 1000 Watts and a limit on out-of-band emissions of $76 + 10 \log(\text{Power})$ for commercial base and fixed transmitters operating in the 747-762 MHz band. If it is assumed that the 764-776 MHz band is used for public safety base-to-mobile communications and the 794-806 MHz band is used for public safety mobile-to-base communications, there are two interference scenarios that should be considered:

- commercial base/fixed transmitter and public safety mobile receiver;
- commercial base/fixed transmitter and public safety base receiver.

This analysis will determine the potential interference impact to public safety receivers from commercial base/fixed transmitters that comply with the out-of-band emission limit of $76 + 10 \log(\text{Power})$ adopted by the Commission. The potential for interference will be expressed in terms of the distance separation that is required to preclude interference to the public safety receiver.

ANALYSIS METHODOLOGY

The power of the potential interfering signal from the commercial transmitter at the input of a public safety receiver is found using the following equation:

$$I = P_T + G_T + G_R - L_p - FDR - L_{tx} - L_{rx} \quad (1)$$

where

- P_T is the transmitter power of the commercial transmitter (dBm);
- G_T is the antenna gain of the commercial transmitter (dBi);
- G_R is the antenna gain of the public safety receiver (dBi);
- L_p is the propagation loss between the commercial transmitter and the public safety receiver (dB);
- FDR is the frequency dependent rejection (dB);
- L_{tx} is the cable/insertion loss of the commercial transmitter (dB);
- L_{rx} is the cable/insertion loss of the public safety receiver (dB).

In equation 1, the FDR term is the reduction in the received power of a signal resulting from the on-tune rejection (OTR) and off-frequency rejection (OFR) of a receiver to the emission spectrum of an interfering signal.¹ OTR and OFR result when only a portion of the energy contained in the emission spectrum of an interfering signal occurs at frequencies that are within the tuned selectivity bandwidth of a receiver. OTR occurs when the selectivity bandwidth of a receiver is smaller than the emission bandwidth of the interfering signal. OFR occurs because of the detuning of the receiver with respect to the transmit frequency of the interfering signal. For the purposes of this analysis, the OFR is the out-of-band emission attenuation of $76 + 10 \text{ Log (Power)}$ adopted by the Commission. The OTR is calculated using:

$$\text{OTR} = 10 \text{ Log } (B_T/B_R) \quad \text{for } B_T > B_R$$

$$\text{OTR} = 0 \quad \text{for } B_T \leq B_R$$

Solving equation 1 for the propagation loss yields:

$$L_p = P_T + G_T + G_R - I - \text{OFR} - \text{OTR} - L_{tx} - L_{rx}$$

$$L_p = P_T + G_T + G_R - I - (76 + 10 \text{ Log}(p_T)) - 10 \text{ Log}(B_T/B_R) - L_{tx} - L_{rx} \quad (2)$$

where p_T is the transmitter power in Watts.

As previously stated in this proceeding, the level of allowable interference appropriate for mission-critical public safety applications is 6 dB below the noise floor of the receiver.² This level will result in a 1 dB increase in the noise floor of the public safety receiver. For a 6.25 kHz bandwidth receiver the thermal noise floor is -136 dBm. Typical receiver noise figures range from 8 to 10 dB. This means that the receiver internal noise floor will range from -126 dBm to -128 dBm, which is consistent with the levels stated previously in this proceeding. Therefore, a reasonable level for the interference threshold to be used in this analysis for public safety receivers is given by:

$$I = -126 - 6 = -132 \text{ dBm}$$

Substituting this interference threshold into equation 2 will give the propagation loss that is required to preclude interference to a public safety receiver.

¹ Krebler, W., Cameron, S., *The Definition of Frequency Dependent Rejection*, IEEE Transactions on Electromagnetic Compatibility, Vol. EMC-21, (Nov. 1979), at 349.

² *Ex Parte* Comments, WT Docket No. 99-168: Motorola Inc. (Dec. 2, 1999) at 2; FreeSpace Communications (Nov. 24, 1999) at 3; and the Federal Law Enforcement Wireless Users Group (Dec. 9, 1999) at 6.

From the propagation loss computed in equation 2, the distance separation that is required to preclude interference to a public safety receiver can be determined from the equation below:

$$20 \log D_{\text{Sep}} = L_p - 20 \log F - 32.45 - L_{\text{Clutter}} \quad (3)$$

where

F is the frequency of the commercial transmitter (MHz);

D_{Sep} is the distance separation between the commercial transmitter and the public safety receiver that is required to preclude interference (km);

L_{Clutter} is the local clutter loss attenuation factor (dB).

ANALYSIS OF INTERFERENCE SCENARIOS

Commercial Base/Fixed Transmitter and Public Safety Mobile Receiver

To assess whether the out-of-band emission limit adopted by the Commission in the First R&O for commercial base/fixed transmitters operating in the 747-762 MHz will protect public safety mobile receivers in the 764-776 MHz band this analysis will consider the following technical factors:

- 100 W commercial base/fixed transmitter power;
- 10 dBi commercial base/fixed transmitter antenna gain;³
- 2 dB commercial base/fixed transmitter insertion/cable losses;
- 762 MHz commercial base/fixed transmitter frequency;
- 6.25 kHz, 250 kHz, 500 kHz, and 1 MHz commercial base/fixed transmitter bandwidths;
- 6.25 kHz public safety mobile receiver bandwidth;⁴
- 0 dBi public safety mobile receiver antenna gain;
- 0 dB public safety mobile receiver insertion/cable losses;
- -5 dB clutter loss factor.

³ Mobile Cellular Telecommunications Analog and Digital Systems Second Edition, William C. Y. Lee, at 167.

⁴ 6.25 kHz represents the channel bandwidth for the public safety receivers. The Equivalent Noise Bandwidth of the receiver is narrower than the channel bandwidth.

Using equations 1 through 3 the distance separations that are required to preclude interference to a public safety mobile receiver are given in Table A-1.

**Table A-1. Required Distance Separation Between a
Commercial Base/Fixed Transmitter
and a Public Safety Mobile Receiver to Preclude Interference
(Out-of-Band Emission Limit: $76 + 10 \log(\text{Power})$)**

| Commercial Base/Fixed Transmitter Bandwidth | Distance Separation Required to Preclude Interference |
|--|--|
| 6.25 kHz | 880 m |
| 250 kHz | 139 m |
| 500 kHz | 98 m |
| 1 MHz | 70 m |

The distance separations shown in Table A-1 represent the geographic area (interference zone) around a commercial base/fixed transmitter where the reception of a public safety mobile receiver will be degraded. As shown in Table A-1, depending on the bandwidth of the commercial base/fixed transmitter these interference zones can be quite large. Furthermore, depending on the number of commercial base/fixed transmitters a large percentage of the public safety system coverage area would be impacted.

The analysis was repeated for a slightly more stringent limit of out-of-band emissions. Table A-2 gives the required distance separation using the slightly more stringent limit on base transmitter out-of-band emissions of $80 + 10 \log(\text{Power})$.

**Table A-2. Required Distance Separation Between a Commercial Base/Fixed Transmitter and a Public Safety Mobile Receiver to Preclude Interference
(Out-of-Band Emission Limit: $80 + 10 \log(\text{Power})$)**

| Commercial Base/Fixed Transmitter Bandwidth | Distance Separation Required to Preclude Interference |
|--|--|
| 6.25 kHz | 555 m |
| 250 kHz | 88 m |
| 500 kHz | 62 m |
| 1 MHz | 44 m |

The distance separations required to preclude interference are related to the received strength of the desired signal. The distance separation required to preclude interference is greatest in weak signal or fringe areas. Weak signal areas occur when the mobile receiver is far from the base/fixed transmitter, or in areas where the desired signal is attenuated by terrain,

foliage, or building shadowing. The required distance separations shown in Table A-2 represent a weak signal condition. As the public safety mobile receiver moves closer to the base station the strength of the desired signal will increase, providing additional protection against interference. Assuming a radius of coverage of 16 km for a public safety base transmitter and a commercial base transmitter out-of-band emission limit of $80 + 10 \log (\text{Power})$, Table A-3 illustrates how the distance separation required to preclude interference decreases as the public safety mobile receiver moves closer to the public safety base transmitter.

Table A-3. Required Distance Separation from a Commercial Base/Fixed Transmitter to Preclude Interference to a Public Safety Mobile/Portable Receiver as a Function of the Distance From the Public Safety Base Transmitter

| Distance Between the Public Safety Base Transmitter and the Mobile Receiver (km) | Distance Separation Required to Preclude Interference (m) | | |
|--|---|---------|-------|
| | 250 kHz | 500 kHz | 1 MHz |
| 16 | 88 | 62 | 44 |
| 15 | 82 | 58 | 41 |
| 14 | 77 | 55 | 39 |
| 13 | 71 | 51 | 36 |
| 12 | 66 | 47 | 33 |
| 11 | 60 | 43 | 30 |
| 10 | 55 | 39 | 28 |
| 9 | 49 | 35 | 25 |
| 8 | 44 | 31 | 22 |
| 7 | 38 | 27 | 19 |
| 6 | 33 | 23 | 17 |
| 5 | 27 | 19 | 14 |
| 4 | 22 | 16 | 11 |
| 3 | 16 | 12 | 8 |
| 2 | 11 | 8 | 6 |
| 1 | 5 | 4 | 3 |

Commercial Base/Fixed Transmitter and Public Safety Base Receiver

To assess whether the out-of-band emission limit adopted by the Commission in the First R&O for commercial base/fixed transmitters operating in the 747-762 MHz will protect public safety base receivers in the 794-806 MHz band this analysis will consider the following technical factors:

- 100 W commercial base/fixed transmitter power;
- 10 dBi commercial base/fixed transmitter antenna gain;
- 2 dB commercial base/fixed transmitter insertion/cable losses;
- 762 MHz commercial base/fixed transmitter frequency;
- 6.25 kHz, 250 kHz, 500 kHz, and 1 MHz commercial base/fixed transmitter bandwidths;
- 6.25 kHz public safety base receiver bandwidth;
- 8 dBi public safety base receiver antenna gain;
- -1 dB for public safety base receiver insertion/cable losses;
- 0 dB clutter loss factor.

Using equations 1 through 3 the distance separations that are required to preclude interference to a public safety base receiver are given in Table A-4.

**Table A-4. Required Distance Separation Between a Commercial Base/Fixed Transmitter and a Public Safety Base Receiver to Preclude Interference
(Out-of-Band Emission Limit: $76 + 10 \log(\text{Power})$)**

| Commercial Base/Fixed Transmitter Bandwidth | Distance Separation Required to Preclude Interference |
|--|--|
| 6.25 kHz | 4410 m |
| 250 kHz | 697 m |
| 500 kHz | 493 m |
| 1 MHz | 349 m |

When the out-of-band emissions from a commercial base/fixed transmitter interfere with a public safety base station receiver, the transmissions from a public safety mobile transmitter located at the fringe of the coverage area will be degraded. This effectively results in a reduction of the coverage area of the public safety base transmitter. As shown in Table A-4, the distance at which commercial base/fixed transmitters can degrade the reception of public safety communications is large.

The analysis was repeated for a slightly more stringent limit on out-of-band emissions for the commercial base/fixed transmitter. Table A-5 gives the required distance separation using a slightly more stringent limit on base/fixed transmitter out-of-band emissions of $80 + 10 \text{ Log (Power)}$.

**Table A-5. Required Distance Separation Between a Base/Fixed Transmitter and a Public Safety Base Receiver to Preclude Interference
(Out-of-Band Emission Limit: $80 + 10 \text{ Log (Power)}$)**

| Commercial Base/Fixed Transmitter Bandwidth | Distance Separation Required to Preclude Interference |
|--|--|
| 6.25 kHz | 2.8 km |
| 250 kHz | 440 m |
| 500 kHz | 311 m |
| 1 MHz | 220 m |

CONCLUSION

As shown in this analysis the distance separation required to preclude interference from a commercial base/fixed transmitter with the out-of-band emission limit adopted in the First R&O are relatively large depending on the bandwidth of the commercial base/fixed transmitter. Adopting a limit on out-of-band emissions of $80 + 10 \text{ Log (Power)}$ in the 764-776 MHz and 794-806 MHz bands, in conjunction with a minimum limit on the bandwidth for the commercial base/fixed transmitters operating in the 747-762 MHz band will provide adequate protection to public safety mobile receivers. Adopting a minimum bandwidth on the order of 200 kHz should not impact the third generation wireless applications envisioned for the 700 MHz bands. However, if the Commission does not adopt a minimum bandwidth for commercial base/fixed transmitters operating in the 747-762 MHz band a more stringent limit on out-of-band emissions should be adopted in order to protect public safety base and mobile receivers.

ATTACHMENT B

ANALYSIS OF OUT-OF-BAND EMISSIONS FOR COMMERCIAL MOBILE TRANSMITTERS OPERATING IN THE 777-792 MHz BAND

INTRODUCTION

For commercial mobile transmitters operating in the 777-792 MHz band, the Commission has adopted an ERP limit of 30 Watts for mobile transmitters. A limit on out-of-band emissions of $65 + 10 \log(\text{Power})$ in the 764-776 MHz and 794-806 MHz public safety bands was also adopted. If it is assumed that the 764-776 MHz band is used for public safety base-to-mobile communications and the 794-806 MHz band is used for public safety mobile-to-base communications, there are two interference scenarios that should be considered:

- commercial mobile transmitter and public safety mobile receiver;
- commercial mobile transmitter and public safety base station receiver.

This analysis will determine the potential interference impact to public safety base and mobile receivers from commercial mobile transmitters that comply with the out-of-band emission limit adopted by the Commission. The potential for interference will be expressed in terms of the distance separation that is required to preclude interference to the public safety receiver.

The analysis methodology developed in Attachment A will be used in this analysis.

ANALYSIS OF INTERFERENCE SCENARIOS

Commercial Mobile Transmitter and Public Safety Mobile Receiver

To assess whether the out-of-band emission limit of $65 + 10 \log(\text{Power})$ adopted by the Commission in the First R&O for commercial mobile transmitters operating in the 777-792 MHz band will provide adequate protection to public safety mobile receivers operating in the 764-776 MHz band, this analysis will consider the following technical factors:

- 30 W commercial mobile transmitter power;
- 0 dBi commercial mobile transmitter antenna gain;
- 2 dB commercial mobile transmitter insertion/cable losses;
- 792 MHz commercial mobile transmitters frequency;
- 6.25 kHz, 250 kHz, 500 kHz, and 1 MHz commercial mobile transmitter bandwidths;

- 6.25 kHz public safety mobile receiver bandwidth;
- 0 dBi public safety mobile receiver antenna gain;
- 0 dB public safety mobile receiver insertion/cable losses;
- 10 dB clutter factor.

Using equations 1 through 3 the distance separations that are required to preclude interference to a public safety mobile/portable receiver are given in Table B-1.

**Table B-1. Required Distance Separation Between a Commercial Mobile Transmitter and a Public Safety Mobile Receiver to Preclude Interference
(Out-of-Band Emission Limit: $65 + 10 \log(\text{Power})$)**

| Commercial Mobile Transmitter Bandwidth | Distance Separation Required to Preclude Interference |
|--|--|
| 6.25 kHz | 535 m |
| 250 kHz | 85 m |
| 500 kHz | 60 m |
| 1 MHz | 42 m |

As shown in Table B-1, depending on the bandwidth of the commercial mobile transmitter the distance separation that is required to preclude interference between a public safety mobile receiver and a commercial mobile transmitter in compliance with the Commission's rules is manageable for the case of single entry interference.

Commercial Mobile Transmitter and Public Safety Base Receiver

To assess whether the out-of-band emission limit of $65 + 10 \log(\text{Power})$ adopted by the Commission in the First R&O for commercial mobile transmitters operating in the 777-792 MHz band will provide adequate protection to public safety base receivers operating in the 794-806 MHz band, this analysis will consider the following technical factors:

- 30 W commercial mobile transmitter power;
- 0 dBi commercial mobile transmitter antenna gain;
- 2 dB commercial mobile transmitter insertion/cable losses;
- 792 MHz commercial mobile transmitters frequency;
- 6.25 kHz, 250 kHz, 500 kHz, and 1 MHz commercial mobile transmitter bandwidths;
- 6.25 kHz public safety base receiver bandwidth;
- 8 dBi public safety base receiver antenna gain;
- -1 dB public safety base receiver insertion/cable losses;
- 5 dB clutter factor.

Using equations 1 through 3 the distance separations that are required to preclude interference to a public safety mobile/portable receiver are given in Table B-2.

**Table B-2. Required Distance Separation Between a Commercial Mobile Transmitter and a Public Safety Base Receiver to Preclude Interference
(Out-of-Band Emission Limit: $65 + 10 \log(\text{Power})$)**

| Commercial Mobile Transmitter Bandwidth | Distance Separation Required to Preclude Interference |
|--|--|
| 6.25 kHz | 2.4 km |
| 250 kHz | 378 m |
| 500 kHz | 267 m |
| 1 MHz | 189 m |

When the out-of-band emissions from a commercial mobile transmitter interfere with a public safety base receiver, the transmissions from a public safety mobile/portable transmitter located at the fringe of the coverage area will be degraded. This in effect, results in a reduction of the coverage area of the public safety base transmitter. As shown in Table B-2, the distances at which commercial transmitters can degrade the reception of public safety communications is large.

The analysis is repeated using a slightly more stringent limit for the out-of-band emissions of the commercial mobile transmitter. Table B-3 shows that the required distance separations can be decreased to manageable values if a slightly more stringent limit on the commercial mobile transmitter out-of-band emissions of $70 + 10 \log(\text{Power})$ in the 794-806 MHz band is employed.

**Table B-3. Required Distance Separation Between a Commercial Mobile Transmitter and a Public Safety Base Receiver to Preclude Interference
(Out-of-Band Emission Limit: $70 + 10 \log(\text{Power})$)**

| Commercial Mobile Transmitter Bandwidth | Distance Separation Required to Preclude Interference |
|--|--|
| 6.25 kHz | 1.3 km |
| 250 kHz | 213 m |
| 500 kHz | 150 m |
| 1 MHz | 106 m |

CONCLUSION

As shown in this analysis the out-of-band emission limit for commercial mobile transmitters operating in the 777-792 MHz band of $65 + 10 \text{ Log (Power)}$ is adequate to protect public safety mobile receivers in the 764-776 MHz band, provided that a minimum limit on transmitter bandwidth is also adopted. Adopting a minimum limit on bandwidth on the order of 200 kHz should not impact the use of the 700 MHz band for third generation wireless technologies.

The analysis has also shown that a slightly more stringent out-of-band emission limit of $70 + 10 \text{ Log (Power)}$ in the 794-806 MHz band for commercial mobile transmitters operating in the 777-792 MHz band is required to protect public safety base receivers. In conjunction with the slightly more stringent limit on out-of band emissions, a limit on the minimum allowable bandwidth on the order of 200 kHz should also be adopted.

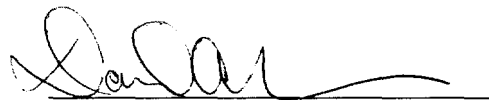
**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

| | | |
|-----------------------------------|---|----------------------|
| In the Matter of |) | |
| |) | |
| |) | |
| Service Rules for the 746–764 and |) | WT Docket No. 99–168 |
| 776–794 MHz Bands, and |) | |
| Revisions to Part 27 of the |) | |
| Commission’s Rules |) | |
| |) | |

CERTIFICATE OF SERVICE

I, David A. Williams, Senior Associate, Booz·Allen & Hamilton, Inc., 8283 Greensboro Drive, McLean, Virginia, 22102-3838, hereby certify that on this date I caused to be served, by first-class mail, postage prepaid (or by hand where noted) copies of the Federal Law Enforcement Wireless Users Group’s Petition for Reconsideration regarding the Commission’s First Report and Order *In the Matter of Service Rules for the 746–764 and 776–794 MHz Bands, and Revisions to Part 27 of the Commission’s Rules* the original of which is filed herewith and upon the parties identified on the attached service list.

DATED at Fair Oaks, Virginia this 29th day of February 2000.



David A. Williams

SERVICE LIST

*The Honorable William E. Kennard, Chairman
Federal Communications Commission
445 12th St., S.W., Rm. 8-B201
Washington, D.C. 20054

*The Honorable Harold Furchgott-Roth, Commissioner
Federal Communications Commission
445 12th St., S.W., Rm. 8-A302
Washington, D.C. 20054

*The Honorable Susan Ness, Commissioner
Federal Communications Commission
445 12th St., S.W., Rm. 8-B115
Washington, D.C. 20054

*The Honorable Michael Powell, Commissioner
Federal Communications Commission
445 12th St., S.W., Rm. 8-A204
Washington, D.C. 20054

*The Honorable Gloria Tristani, Commissioner
Federal Communications Commission
445 12th St., S.W., Rm. 8-C302
Washington, D.C. 20054

*Ari Fitzgerald, Legal Advisor
Office of Chairman Kennard
Federal Communications Commission
445 12th St., S.W., Rm. 8-B201
Washington, D.C. 20054

*Paul E. Misener, Senior Legal Advisor
Office of Commissioner Furchgott-Roth
Federal Communications Commission
445 12th St., S.W., Rm. 8-A302
Washington, D.C. 20054

*Daniel Connors, Legal Advisor
Office of Commissioner Ness
Federal Communications Commission
445 12th St., S.W., Rm. 8-B115
Washington, D.C. 20054

*Peter A. Tenhula
Office of Commissioner Powell
Federal Communications Commission
445 12th St., S.W., Rm. 8-A204
Washington, D.C. 20054

*Karen L. Gulick
Office of Commissioner Tristani
Federal Communications Commission
445 12th St., S.W., Rm. 8-C302
Washington, D.C. 20054

*Thomas J. Sugrue, Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th St., S.W., Rm. 3-C252
Washington, D.C. 20054

*Kathleen O'Brien-Ham, Deputy Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th St., S.W., Rm. 3-C207
Washington, D.C. 20054

*James D. Schlichting, Deputy Chief
Wireless Telecommunications Bureau
Federal Communications Commission
445 12th St., S.W., Rm. 3-C207
Washington, D.C. 20054

*D'Wana R. Terry, Chief
Public Safety & Private Wireless Division
Federal Communications Commission
445 12th St., S.W., Rm. 4-C321
Washington, D.C. 20054

*Ramona Melson, Chief Legal Counsel
Public Safety & Private Wireless Division
Federal Communications Commission
445 12th St., S.W., Rm. 4-C321
Washington, D.C. 20054

*Herb Zeiler
Public Safety & Private Wireless Division
Federal Communications Commission
445 12th St., S.W., Rm. 4-C321
Washington, D.C. 20054

*Katherine Hosford
Public Safety & Private Wireless Division
Federal Communications Commission
445 12th St., S.W., Rm. 4-C321
Washington, D.C. 20054

*Kris Monteith, Chief
Policy Division
Federal Communications Commission
445 12th St., S.W., Rm. 3-C120
Washington, D.C. 20054

*Nancy, Boocker, Deputy Chief
Policy Division
Federal Communications Commission
445 12th St., S.W., Rm. 3-C120
Washington, D.C. 20054

*Stan Wiggins
Policy Division
Federal Communications Commission
445 12th St., S.W., Rm. 3-C120
Washington, D.C. 20054

*Ed Jacobs
Policy Division
Federal Communications Commission
445 12th St., S.W., Rm. 3-C120
Washington, D.C. 20054

*Steve Weingarten, Chief
Commercial Wireless Division
Federal Communications Commission
445 12th St., S.W., Rm. 4-C207
Washington, D.C. 20054

*Jeff Steinberg, Deputy Chief
Commercial Wireless Division
Federal Communications Commission
445 12th St., S.W., Rm. 4-C207
Washington, D.C. 20054

Jeanne Kowalski, Deputy Chief
Public Safety & Private Wireless Division
Wireless Telecommunications Bureau
445 12th St., S.W., Rm. 4-C324
Washington, D.C. 20054

International Transcription Services, Inc.
1231 20th St. N.W.
Washington, D.C. 20037

***HAND DELIVERED**